Approved For Release 2005/05/02 : CIA-RDP78B04770A002200040002-3

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Project # 02288

Post Office Box 6788
Fort Davis Station
Washington, D. C. 20020

13 August 1968

REGISTERED

25X1 [redacted]

Declass Review by NGA.

Vice President

25X1 Subject : [redacted]

Reference: (a) Development Objectives for Split-Format 1540 Light Table and Mount for Various Microstereoscopes
(b) Specification No. DB-1001, Dated 31 August 1966

Gentlemen:

The Development Objectives, reference (a) were attached to and formed a part of the subject Contract, dated 28 June 1968. Reference (b), titled "Contractual Documentation to be Supplied by Contractors" was an attachment to reference (a).

During conversations between yourself and the Contracting Officer's Technical Representative in June and July 1968, you requested clarification of certain Human Factors items appearing in Paragraphs 4.2.1.4. and 4.2.1.5. of reference (a). Specifically, the value given for the average maximum height of the adult population's eyes above floor level when standing was questioned, and amplification of the functional arm reach distances was requested.

The first of these items was incorrect due to a typographical error in our basic reference material. The correct value for this item together with additional information on the functional arm reach distances is contained in a corrigendum to reference (a), a copy of which is attached. It is understood that these changes are made to amplify existing specifications and are entirely within the scope of the present contract.

In accordance with Paragraph 2.1.1. of reference (b), you are advised that control number NP-V-28-02288 has been assigned. This control number should appear on the reports required under Paragraph 2.2. of reference (b), as well as on all other documentation submitted by you under this contract.

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GROUP 1
Excluded from automatic downgrading and declassification

NOTICE
This material contains information affecting the national defense of the United States within the meaning of the espionage laws, Title 18, USC, Secs. 793 and 794, the transmission or revelation of which in any manner to an unauthorized person is prohibited by law.

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[redacted]

Technical questions relative to the above items, or other aspects of this contract, may be referred to the Contracting Officer's Technical Representative for this contract [redacted]

This letter in no way alters any of the terms and conditions of the subject Contract.

Very truly yours,

[redacted]
Contracting Officer

BY _____
Duly Authorized Representative

Attachment:
Corrigendum to Development Objectives

Distribution:
Orig. - Addressee
1 - GCB
1 - NPIC
1 - File

25X1 OL/PD/CA&SB/CAS [redacted]
(14 Aug 68)

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CORRIGENDUM

to

DEVELOPMENT OBJECTIVES

SPLIT-FORMAT 1540 LIGHT TABLE AND MOUNT FOR VARIOUS MICROSTEREOSCOPES

Paragraph 4.2.1.4. - On line fourteen of this paragraph, delete the number 73 and substitute 70.3 therefore.

Paragraph 4.2.1.5. - Delete the entire paragraph and substitute the following therefore:

4.2.1.5. Location of Controls. All controls, including the film hand wheels will be positioned so they can be easily manipulated. In this respect, the following functional arm reach distances will apply.

Height Above Seat Ref Pt. (in.)	Angle from straight ahead reach						
	0°	15°	30°	45°	60°	75°	90°
0				16.0	17.9	17.4	18.5
6	17.0			22.4	23.8	23.9	25.6
12	19.4	21.5	23.5	24.9	27.0	27.6	28.0
18	21.3	22.9	25.4	26.9	28.1	29.3	30.0
24	21.6	23.4	24.9	26.4	28.0	28.9	30.0
30	20.1	22.0	23.7	26.4	27.4	28.3	29.3
36	17.4	18.7	20.2	22.4	23.9	25.1	25.9
42	12.7	13.2	13.6	16.0	19.2	20.3	21.1

NOTE: a. Reach dimensions are in inches forward of the seat reference point which, for purposes of these development objectives, shall be considered to be located in a plane which is perpendicular to the front of the table and which passes through its vertical center line, and at a horizontal distance of 15 inches from the front of the light table and 18 inches above the floor.

b. Add: 1 inch if only knobs are to be operated; 3 inches if only toggle switches or push buttons are used; 4 inches at 0 degrees and 3 inches at 45 degrees if shoulder extension is possible; 6 inches at 0 degrees and 4 inches at 45 degrees if

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shoulder extension and trunk rotation is possible; 16 inches at 0 degrees, 12 inches at 45 degrees, and 8 inches at 90 degrees if complete body freedom is possible (e.g., bending forward in the seat).

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DEVELOPMENT OBJECTIVE

SPLIT-FORMAT 1540 LIGHT TABLE AND MOUNT FOR VARIOUS MICROSTEREOSCOPES

1. INTRODUCTION

These development objectives describe the requirements to be met in the design and development of a specially configured light table which incorporates an integral, precision mount to accommodate various Government furnished microstereoscopes.

2. CONCEPT

This development is directed toward the design and fabrication of a prototype light table and microstereoscope mount. The table will incorporate two separate light sources and a film looping mechanism so that widely separated conjugate stereo views occurring on the same roll of film may be brought into close proximity for convenient viewing under the microstereoscope. Ease of film loading, superior illumination, and a vibration free precision microstereoscope mount are sought after characteristics.

3. GENERAL DESCRIPTION

This table will incorporate two separate 15" by 20" illuminated areas adjacent to each other along their shorter dimension so that their combined measurements will be approximately 15" X 40". The longer dimension of these light sources will be parallel to the length of the spooled film/s being viewed.

Provision will be made for viewing single rolls of 70mm, 5", 6.6" or 9.5" wide film; parallel viewing of two of the same width, or any combination of two different widths, of the following size films: 70mm, 5" or 6.6"; and in-line viewing of two of the same width of the following size films: 70mm, 5", 6.6" or 9.5".

The table will include a simple film looping mechanism which will allow forming a dead loop of film below the table in order that widely separated film frames, on the same roll of film, may be arranged adjacent to each other for convenient stereo viewing (looping of parallel rolls of film will not be required). This mechanism will be capable of forming a film loop of at least 76 inches with greater film looping capability desirable.

In addition, a mount will be incorporated to rigidly support the microstereoscope at the correct height above the light table surface. Simple hand controls will allow for translation of the microstereoscope in both the X and Y directions.

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4. REQUIREMENTS

4.1. Illumination Sources

4.1.1. General. Two separate 15" X 20" glass formats shall be illuminated by easily replaced fluorescent-type sources.

4.1.1.1. Illumination Level. Each of the illumination sources must provide a maximum level of at least 3,000 foot lamberts measured at the glass viewing surface, within a 2" radius of its geometric center, after a minimum of 4 hours continuous operation. The maximum levels of the two illumination sources shall not differ by more than 100 foot lamberts at the time of this measurement. The minimum level of each of the sources should be less than 75 foot lamberts measured at the glass viewing surface, within a 2" radius of its geometric center. Between these two extremes the illumination level should be continuously variable with logarithmic control preferred. In addition, with either of the two sources set at maximum or minimum illumination level, there will not be a change of more than 100 foot lamberts in its illumination level when the illumination of the other source is adjusted full range.

4.1.1.2. Color of Illumination. Broad band white illumination will be a design goal with adjustment of luminance level producing a minimum change in color temperature. Radiation below 380 nanometers and above 750 nanometers must be minimized.

4.1.1.3. Uniformity of Illumination. Under the worst illumination condition the maximum linear brightness gradient for each of the illumination sources must not exceed 33% between any two points (designated by X's) as shown on the following diagram. This requirement shall apply with the glass viewing surfaces in normal operating position (table closed).

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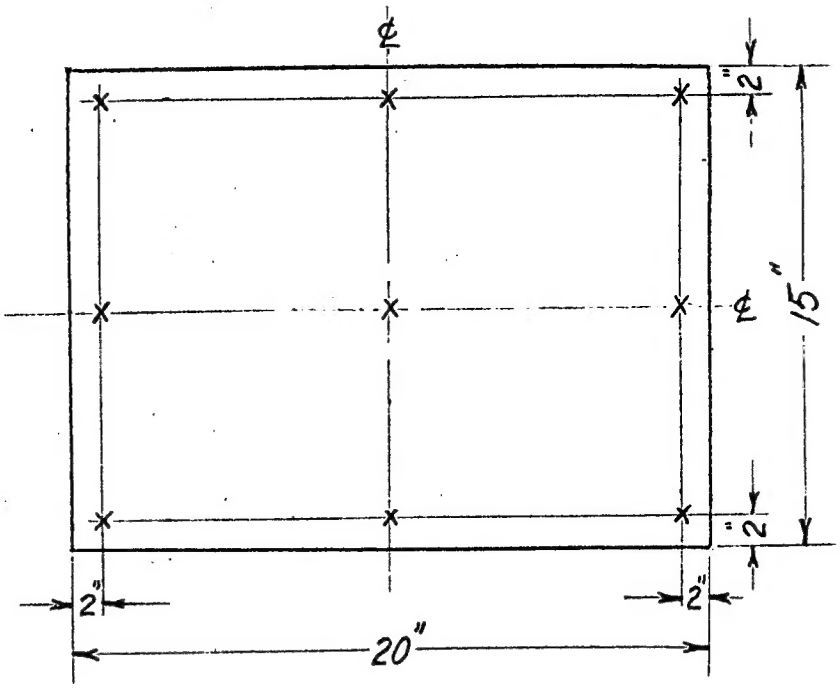

4.1.1.4. Flicker. Flicker frequency of each of the illumination sources will exceed 80 hertz except for low luminance (less than 100 foot lamberts) where frequencies down to 60 hertz are acceptable. Beat frequencies of multiple lamp sources must exceed the above levels.

4.1.1.5. Heat. The illumination sources must be able to function continuously at maximum intensity over a 24-hour period, in a room with an 80°F ambient temperature. With film of 2.0 density covering at least 66% of the illuminated glass viewing surface, and the remainder masked, the temperature of the film shall not exceed 100°F, or 30°F over ambient, whichever is higher. Also, no portion of the top, front or sides of the table shall exceed 110°F. These temperature measurements shall be taken after 4-hours continuous operation of the light sources at maximum intensity.

4.1.1.6. Diffuser. A suitable diffuser shall be located between the glass viewing surface and the light emitter of each illumination source.

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4.1.1.7. Shade. An adjustable shade must be provided at each of the illumination sources to mask out all of the viewing surface not actually covered by film. The shade must be located between the diffuser and the glass viewing surface of the illumination source. It shall be mounted along the long dimension of the unit and be extendable across the short dimension toward the normal operator position (i.e., back to front). Means shall be provided for convenient extention, retraction and firm intermediate positioning of the shade between its extremes of operation. These extremes shall be the fully retracted position, where the shade must not encroach upon the illuminated area, and the fully extended position, where the shade must mask the unused portion of the glass viewing surface when viewing a single 70mm wide roll of film. In addition, a separate, easily positioned, appropriate width shade will be provided for masking any unlighted area resulting when viewing two films parallel to each other (Paragraph 3 refers). When not in use, this latter shade must not encroach upon the illuminated area.

4.2. External Configuration

4.2.1. General. The basic features mentioned in Paragraph 3, together with their necessary sub-components, will be built into a convenient and sturdily designed elevating table.

4.2.1.1. Size. The entire unit shall measure approximately 58 inches in length, including the film supports, and 30 inches in depth (front to back). The distance from the glass viewing surface to the bottom of the light table proper, i.e., the light enclosure and film loop mechanism, shall not exceed 5.5 inches.

4.2.1.2. Weight. The entire unit must remain as light as possible without sacrifice of good stability.

4.2.1.3. Elevating Table. The light table and microstereoscope mount shall be built on, or as an integral part of, an elevating table. This table shall be conveniently adjustable throughout

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a range of height which will satisfy the conditions delineated in Paragraph 4.2.1.4. The elevating mechanism shall provide firm positioning of the light table proper throughout the elevation range. In addition, this table will be equipped with resilient tired wheels, each of which must have its own easily applied locking type foot actuated brake.

4.2.1.4. Viewing Position. The light table and the translating microstereoscope mount must be designed to offer the microstereoscope in a comfortable position with the operator standing and/or seated. It is understood that these conditions depend on the height of the illuminated glass viewing surface, the requirement for the rhomboid/s to adequately clear the film and the varying working distances of the microstereoscope's rhomboids. Human factors to be considered in effecting a comfortable viewing position are: (a) The average maximum height of the adult population's eyes above floor level when standing is 73 inches; (b) The average minimum height of the adult population's eyes above floor level when sitting is 43.5 inches; (c) For adequate knee clearance, with operator seated, the minimum height of the bottom of the table above floor level should be no less than 25 inches.

See attached corrigendum.

4.2.1.5. Location of Controls. All controls, including the film hand wheels will be positioned so they can be easily manipulated. In this respect, the following functional arm reach distances will apply.

Angle From Straight Ahead Reach						
0°	15°	30°	45°	60°	75°	90°
17.0"	*	*	22.4"	23.8"	23.9"	25.6"

4.2.1.6. Finish. To reduce specular glare, which may interfere with efficient operator performance, the external surfaces of the entire light table unit should have non-glossy finishes with a recommended reflectance between 25 and 30%.

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4.3. Film Spool Support

4.3.1. General. Four film support stations will be provided to accommodate the various width films and combinations described in Paragraph 3. They must be designed so that they will not drop the heaviest full spool/s of film when the spool/s are rotating at 500 revolutions per minute.

4.3.1.1. Loading Mechanism. A means shall be provided for fast loading and unloading of either a single or two rolls of film of the widths and combinations set forth in Paragraph 3. Rolls will range up to, and include, 500 feet capacity. This loading system must operate quickly and at the same time be positive in action.

4.3.1.2. Spindle Mechanism. The spindle mechanism which engages and secures the spool must be designed for easy one hand operation so that the fully loaded spool can be held in one hand while the holding mechanism is activated with the other. A positive but quick release lock must be incorporated.

4.3.1.3. Brackets. Three holding brackets will be provided at each film support station. At each station, the bracket nearest the side of the table which the operator will normally face will be fixed while the other two will be movable. These moveable brackets will operate freely on their ways to facilitate positioning and will be equipped with a quick locking mechanism to hold them firmly in any chosen position. A visual reference scale and indexing device with positive detents will be furnished to allow accurate positioning of the brackets to hold the various width spools and assure accurate tracking of the film/s across the glass viewing surfaces parallel to the longitudual axis of the light table and to each other.

4.4. Film Transport

4.4.1. General. The film transport will be designed for convenient manual and motorized operation. The operator shall have the option of using either the manual or motorized capability without actuation of or interference from the other.

4.4.1.1. Film Capacity. Each film support station, and its associated film transport, will be capable of handling the various width films and combinations thereof, described in Paragraph 3, in lengths up to and including 500 feet.

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4.4.1.2. Film Movement. Provision will be made for bi-directional movement of the film/s at each film support station through a 1:1 ratio handwheel and/or a suitable size motor. With two rolls of film mounted at the same film support station (for parallel viewing) it shall be possible to drive both rolls of film in one direction simultaneously with the same handwheel. Under like film mounting conditions it shall be possible to drive one of the rolls of film in one direction and the other roll of film in the other direction simultaneously.

4.4.1.3. Rollers. A minimum number of separate rollers must be positioned so that film can be transported either emulsion up or emulsion down without scratching the film surfaces. The rollers must have a hard, smooth, non-corrosive, metallic surface.

4.4.1.4. Film Tension. Both the manual and the motorized drive systems must be able to maintain enough tension on the film at all film speeds and conditions of acceleration and deceleration of the film/s to prevent slack loops of film from forming. The tension system used must not damage the film.

4.4.1.5. Handwheels. Solid disk handwheels with revolving handles will be used for manual cranking of the film rather than balanced cranks with threaded type handles.

4.5. Microstereoscope Mount

4.5.1. General. A rigid, precision mount shall be provided to place either of the following three microstereoscopes in correct position for focus and for comfortable viewing of film materials located on the two 15" X 20" glass viewing surfaces: (a) [redacted] Zoom 70 Stereoscope with or without 2X wide span rhomboid attachements; (b) [redacted] Zoom 240 Stereoscope; (c) [redacted] Versatile Stereoscope with all relays, i.e., 0.43X, 1.0X and 4.0X.

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4.5.1.1. Focus. A fine and a course focusing adjustment shall be furnished as an integral part of the mount. These adjustments should be smooth acting with minimum play between the hand controls and the actual mechanism. The fine focus will be adjustable throughout the entire focusing range.

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4.5.1.2. Translation. With any of the microstereoscopes fixed in the mount, and using the center of the scope as a reference, translation in the Y direction shall be adequate to cover the full depth of the glass viewing surface, i.e. 15". Translation in the X direction should be maximum commensurate with the overall length dimension (Paragraph 4.2.1.1. refers) and the mount clearance requirements. Also, the carriage must be designed so that the microstereoscope may be moved over the entire translation field without re-focusing the optics.

4.5.1.3. Carriage Motions. The carriage motions of the mount must have low friction coefficients, be smooth (without binding) and positive acting, and as free of vibration as possible. With the carriage lock disengaged, a force of 2 pounds or less will be sufficient to move the carriage in any combination of X and Y directions.

4.5.1.4. Locks. A firm, conveniently actuated locking capability shall be designed into the focusing mechanism. Easily engaged locks must be provided to hold the microstereoscope mount's carriage firmly at any position of its travel in the X and Y directions. In addition, with the carriage lock engaged, a force of 10 pounds or greater will be required to move the carriage in any combination of X and Y directions.

4.5.1.5. Mount Rigidity. Because of the high magnification, small depth of focus and long cantilever of the rhomboid relay systems, the microstereoscopes to be used on this light table are extremely susceptible to vibration. Therefore, the mount must be designed so that, when using the highest magnification and/or longest rhomboid relay system, there will be no visible vibrations induced by the light table itself, with the microstereoscope mount positioned anywhere within its range of travel.

4.6. General Requirements

4.6.1. Reliability. Before acceptance, this light table will be required to operate under real or simulated conditions for 500 hours (not necessarily continuous) without failure. Should failure occur during this test, appropriate repair/s will be made by the Contractor and the test reconducted for a period of 500 hours.

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4.6.2. Construction. This equipment shall meet the highest commercial standards of construction.

4.6.3. Maintenance. Ease of maintenance will be a primary consideration in the design of this light table. Convenient access to the internal portions of the table will be effected by strategic location of cover plates or access panels equipped with quick acting captive screws. Indicator lights and fuses, if used should be easily replacable from the front of the panel. Electric circuit test points should be available at the power input, power switch, intensity control, lamp output and other necessary points. A circuit diagram will be provided (e.g., mounted inside an access panel). Any special tools required for routine maintenance will be provided.

4.6.4. Cooling. Should liquid cooling be required, the coolant will be of a type which is not injurious to operating or maintenance personnel or to the equipment itself. Particular attention should be directed toward designing a system which will direct any leaks away from the operator. An easy coolant replenishment method should be provided. In addition, all areas of the cooling system must be accessible for inspection and maintenance.

4.6.5. Noise. The noise generated by the table shall be regulated so as to minimize annoyance to either the operator or other workers in the area. Maximum equipment noise energy levels shall not exceed the Noise Criterian 40 Curve values set forth in the noise criterion (NC) curve graph appearing in MIL-STD-803A-2 USAF. Energy levels concentrated in narrow bands (e.g., transformer hum, fan noise, etc.) shall be at least 10 decibels below the NC-40 curve values. Measurements shall be referenced to the normal head position of the average interpreter.

4.6.6. Vibration. Mounting of moving equipment (e.g., ventilating fans, pumps, etc.) should provide maximum attenuation at frequencies above 5-10 Hertz.

4.6.7. Safety. The following minimum safety precautions will apply: (1) All external, non-current-carrying metal parts must be electrically connected and grounded; (2) Provision must be made to prevent personnel from coming into contact with circuits operating with an open circuit potential of 30 volts or more and a capability for delivering 2.5 peak milliamperes or more into a short circuit. Where necessary, interlocks will be employed; (3) Glass table surfaces must be capable of supporting maximum anticipated weights. Safety or "non-shatter" glass is recommended; (4) Special precautions

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to avoid breakage of metallic vapor lamps must be made; (5) Moving parts (e.g., ventilating fans, drive belts or gears) must be enclosed. (This requirement does not necessarily apply to the film spool, film, film spool spindles and handwheels); (6) Sharp edges or corners should be avoided; (7) Design shall preclude inadvertant blockage of ventilating air intakes or exhausts; (8) Ventilating air exhaust shall be directed away from the operator; (9) Appropriate warning signs shall be strategically placed as necessary.

4.6.8. Mounts for Optical Instrumentation. The following general criteria will apply: (1) Design and positioning of mounts must permit convenient access for installation and removal of instrumentation and film; (2) Mounting devices shall be sufficiently rigid to preclude instrument misalignment by normal handling and operation; (3) Positioning adjustments in X and Y should require only one hand for operation. The direction of applied force should not be critical to avoid binding; (4) Height adjustment must be provided with stops to preclude accidental contact of the optical instruments with the table surface.

4.6.9. Controls. The operating controls will be placed on the front of the long side of the table nearest the operator (instrusion into or above the top or working surface will not be allowed). A power switch, which may be easily differentiated from all other switches will be strategically placed and be equipped with a red power-on warning light. This light shall cause a minimum of interference to the operator's vision when he is engaged in normal film viewing activity. All controls will be clearly marked.

4.6.10. Power. This equipment will be capable of operating in all modes on 117 volt, plus or minus 10 to 15 volts, 60 Hertz, single phase, alternating current. Proper fusing shall be supplied to prevent circuit overloads, and a spare fuse/s shall be located immediately adjacent to each fuse holder. A retractable heavy duty, Underwriter's Laboratory Listed, 3-conductor electrical extension cord with molded 3-prong plug will be furnished with the table for connection to the operating power source. This cord will be at least 20 feet long.

4.6.11. Reports, Manuals and Inspections. During the period of performance of the contract, the Contractor will be required to submit five copies of each monthly and final report to the Government in accordance with Specification No. DB-1001. At the point in time when the designs are

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finalized, an updated estimate must be given of the cost per table of a production run in quantities of 25, 50, 75 and 100. At the end of the contract, three copies each of an operator's manual and a maintenance manual must be delivered with the prototype equipment. These manuals will be prepared in accordance with Specification No. DB-1003. Preliminary inspection will be conducted at the Contractor's plant; final acceptance will be made at the Sponsor's facility.

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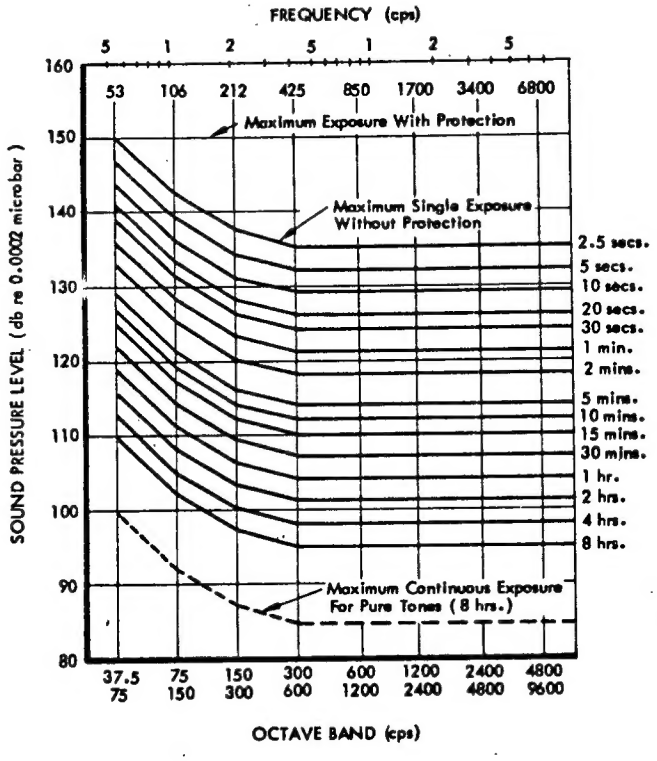
3.5 ACOUSTICS

The following material on noise is from MIL-STD-803A-2 (USAF).

3.5.1 Noise Exposure Limits

Necessary exposures to intense sound shall be as brief as possible. In no case shall personnel be exposed to noise levels that exceed 150 decibels. Facilities and equipment should be designed to preclude the exposure of unprotected personnel to wide-band noise in excess of the octave-band pressure levels and time limits shown in Figure 3.5-1. Narrow-band noise and discrete frequencies should be at least 10 decibels below the wide-band limits. (For discrete frequencies, the logarithmic scale at the top of the figure should be used).



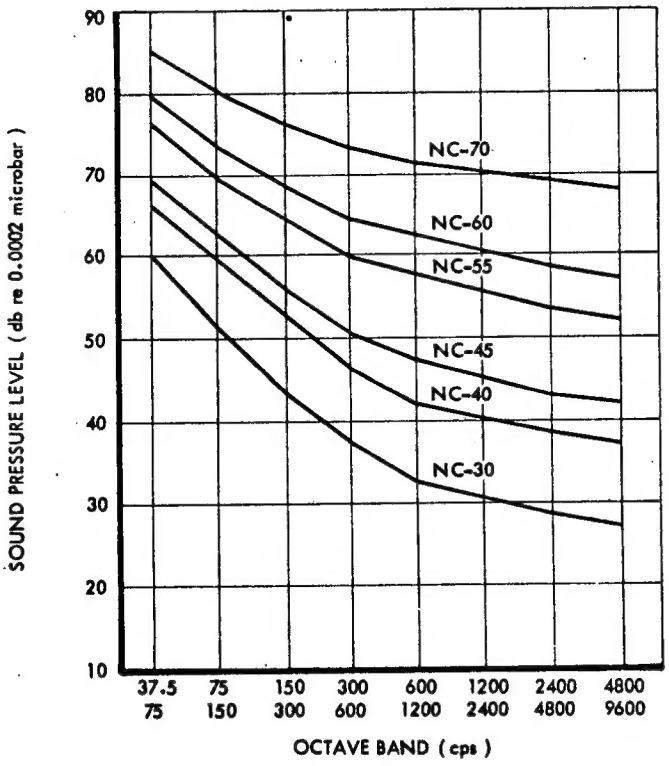
(from MIL - STD - 803A-2 USAF)

FIGURE 3.5-1 EXPOSURE LIMITS FOR WIDE-BAND NOISE AND PURE TONES

Where noise levels exceed the above limits, personnel must be provided with protective devices such as ear plugs, cushions or earmuffs. Preferably such devices should be provided when noise levels are within 10 decibels of the above limits.

3.5.2 Communication and Comfort Limits

Facility and equipment noise must be controlled to levels that do not interfere with required voice communications and that produce minimum annoyance and fatigue effects. In areas where maintenance requires the continuous presence of personnel and occasional voice communication is necessary, the noise level generated by equipment shall not exceed the sound pressure levels shown for various octave bands on Noise Criterion (NC) Curve 70 in Figure 3.5-2. Where intermittent direct communication and occasional telephone conversation are necessary, the level should not exceed NC-60. In offices, shops and other areas where equipment is used regularly by operating personnel and continuous direct communication is required, the noise level should not exceed NC-55. Where frequent telephone communication is necessary in such areas, the level should not exceed NC-45. The noise level in private offices, drafting rooms, conference rooms and similar areas should not exceed NC-40. In areas where telephone use is highly critical or where extreme quiet is required, the level should not exceed NC-30. See Section 4.2.10.3 for specific speech interference levels.



(from MIL - STD - 803A-2 USAF)

FIGURE 3.5-2 NOISE CRITERION (NC) CURVES

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SPLIT-FORMAT 1540 LIGHT TABLE AND MOUNT FOR VARIOUS MICROSTEREOSCOPES

Paragraph 4.2.1.4. - On line fourteen of this paragraph, delete the number 73 and substitute 70.3 therefore.

Paragraph 4.2.1.5. - Delete the entire paragraph and substitute the following therefore:

4.2.1.5. Location of Controls. All controls, including the film hand wheels will be positioned so they can be easily manipulated. In this respect, the following functional arm reach distances will apply.

Height Above Seat Ref Pt. (in.)	Angle from straight ahead reach						
	0°	15°	30°	45°	60°	75°	90°
0				16.0	17.9	17.4	18.5
6	17.0			22.4	23.8	23.9	25.6
12	19.4	21.5	23.5	24.9	27.0	27.6	28.0
18	21.3	22.9	25.4	26.9	28.1	29.3	30.0
24	21.6	23.4	24.9	26.4	28.0	28.9	30.0
30	20.1	22.0	23.7	26.4	27.4	28.3	29.3
36	17.4	18.7	20.2	22.4	23.9	25.1	25.9
42	12.7	13.2	13.6	16.0	19.2	20.3	21.1

NOTE: a. Reach dimensions are in inches forward of the seat reference point which, for purposes of these development objectives, shall be considered to be located in a plane which is perpendicular to the front of the table and which passes through its vertical center line, and at a horizontal distance of 15 inches from the front of the light table and 18 inches above the floor.

b. Add: 1 inch if only knobs are to be operated; 3 inches if only toggle switches or push buttons are used; 4 inches at 0 degrees and 3 inches at 45 degrees if shoulder extension is possible; 6 inches at 0 degrees and 4 inches at 45 degrees if

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shoulder extension and trunk rotation is possible; 16 inches at 0 degrees, 12 inches at 45 degrees, and 8 inches at 90 degrees if complete body freedom is possible (e.g., bending forward in the seat).

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